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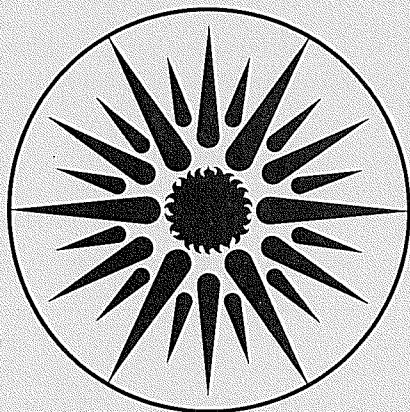
UNIVERSITY OF CALIFORNIA

ENERGY & ENVIRONMENT DIVISION

Perspectives on the Institutional Needs of Joint Implementation Projects for China, Egypt, India, Mexico, and Thailand

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**ENERGY
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DIVISION**

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PREFACE

One avenue for reducing the net emissions of greenhouse gases (GHG) under the Framework Convention on Climate Change (FCCC) is the joint implementation (JI) of policies and projects by signatories to the Convention. Although debate on the practical aspects of JI projects is relatively young, it already includes issues concerning the ability of governments to accept JI projects as well as the project participants' capacity to monitor, evaluate, and verify the financial and GHG benefits.

The focus of this paper is an in-depth, country-by-country analysis of current and conceivable institutions in potential host countries. To understand these concerns better, in August 1994 we asked colleagues in five developing countries to evaluate their countries' institutional capacity for JI projects. Their perspectives are presented here as individual country case studies. We chose the five countries—Mexico, Egypt, Thailand, India, and China—because each has significant potential for JI projects.

To focus the case studies, we sent each author a set of questions pertaining to the Conference of Parties' (COP) potential criteria for JI projects and to the US Initiative on Joint Implementation (USIJI) criteria and considerations. The questions posed to the authors are included below and are organized around five topics: JI project acceptability, project assessment, long-term project monitoring, identifying and quantifying project benefits, and external verification of GHG reductions.

In preparing their responses, authors were asked to think about energy efficiency or forestry projects planned or currently under implementation in their country that could serve as a JI project, and to focus their answers on specifics related to that project. If no appropriate

QUESTIONS POSED TO COLLABORATING AUTHORS ABOUT JOINT IMPLEMENTATION

1. Sample Project

Question

- Briefly describe the potential energy efficiency or forestry JI project you are addressing, including the environmental and non-environmental impacts and benefits of the project.

2. Project Acceptability

Relevant COP and USJI Criteria:

- “Joint implementation is a voluntary activity under the responsibility of two or more Parties; such activity must be undertaken or accepted by the Governments concerned.” (COP)
- “Joint implementation should be beneficial to all Parties involved, and be consistent with their national priorities for sustainable development.” (COP)
- A USJI project “is acceptable to the government of the host country.” (USJI)

Questions:

- What alternative governmental “acceptance” procedure(s) would you envision for this project if it were a JI project?
- Is there a government agency that could handle evaluating and “accepting” JI projects or would a structure have to be created? Who would assess benefits and compatibility with national priorities?
- What particular types of energy efficiency or forestry JI projects would your government be likely to favor and/or be less supportive of? Why? What issues would be most important?

3. Project Assessment

Relevant COP and USJI Criteria:

- “Joint implementation activities should bring about real and measurable results, determined against reasonable baselines.” (COP)
- A USJI project “involves specific measures to reduce or sequester greenhouse gas emissions initiated as the result of the US Initiative on Joint Implementation, or in reasonable anticipation thereof”(USJI)

5. Identifying and Quantifying Project Benefits

Relevant COP and USJI Criteria and Considerations:

- “The benefits of joint implementation activities may be shared between the Parties involved.” (COP)
- The USJI Evaluation Panel will also consider “the potential for the project to lead to changes in greenhouse gas emissions elsewhere.” (USJI)

Questions:

- If a system emerges that allows “credits” for JI projects, how would you recommend that credit be assigned between the project parties, (via negotiations, government policy, let the parties decide, etc.)?
- Should your government be consulted during the project parties’ negotiation of credit assignment?
- Should any other institutions be involved?
- What institution could track “leakages,” i.e. reductions in greenhouse gases at the project site leading to increases in greenhouse gases elsewhere in your country?

6. External Verification and Project Evaluation

Relevant COP and USJI JI Criteria:

- A USJI project “contains adequate provisions for external verification of the greenhouse gas emissions reduced or sequestered by the project.” (USJI)

Questions:

- What external reviewer would be acceptable to your government?
- Should there be a separate institutional structure or mechanism for external verification?
- If so, should it be composed of both internal and external experts?
- What institution should handle enforcement if the external reviewer finds that the project has not met its greenhouse gas commitments?
- What are examples of external verification that have worked for similar projects?

CHAPTER 1: CASE STUDY OF MEXICO

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1.1 Sample JI Project: ILUMEX Energy-Efficient Lighting

ILUMEX, the Project for the Rational Use of Lighting in Mexico, is a good example of a JI project for two reasons: its promotion for grant funding by the Global Environment Facility and its size—ILUMEX is the largest demand-side management project to date in Mexico. Mexico was chosen for a Global Environment Facility project because 75 percent of the electricity used is derived from fossil fuel resources.

ILUMEX aims to promote energy-efficient residential lighting over a two-year period through the introduction of at least 1.7 million compact fluorescent lamps (CFLs). Because CFLs use 75 percent less power than incandescent bulbs, they reduce power demand, electricity use, and as a result, carbon emissions. The Federal Electricity Commission, the national utility, estimates that about 150,000 tons of carbon will be saved over the lifetime (10,000 hours per lamp) of the compact fluorescent lamps at a negative cost of 0.28 \$US/kg of carbon. ILUMEX will disseminate CFLs among residential customers in Guadalajara and Monterrey, the two largest cities served by the Federal Electricity Commission. Under project guidelines, residential customers will be eligible to purchase as many as five CFLs.

ILUMEX will target customers with low electricity-consumption levels. Doing so will reduce lost revenues for the Federal Electricity Commission because electricity consumption by these customers is currently subsidized at prices much below the Commission's marginal cost.

There currently is no Mexican governmental agency with the specific institutional function to “accept” JI projects. The probable next step would be to establish a council, as suggested, composed of members of at least three ministries (foreign affairs, energy, and environment). One of these ministries would have an office where JI projects would be registered.

Forestry projects, however, are among the types of JI projects the Mexican government is less likely to accept. Official representatives of Mexico’s poor peasants often do not have the political legitimacy to commit entire peasant communities to support such long-term projects as large-scale tree planting. This lack of legitimacy was dramatically demonstrated by the events of 1994 in the southern state of Chiapas. There, large areas of forests are inhabited by poor Indians, people who were believed to support the government based on election results, but who turned out not to support the government at all.

Although “top-down” forestry projects could be implemented in forested peasant communities, the more impoverished the community, the more likely the people will use the JI forest resources as fuel and fodder for survival. As the initial attention to JI projects wanes, project corruption may result in forest communities not receiving remuneration for creating carbon sinks, thus eliminating whatever sense of ownership and commitment communities may have to the project. The Mexican government might reject a JI forestry project to avoid sanctions resulting from the failure of a project.

1.3 Project Assessment

Assessment Institutions

Assessment would require two levels of institutional structures: governmental and project-level. At the governmental level, the government would have to assemble the multi-ministry council to assess JI projects. This integrated council would accept and register the

characteristics of the incandescent lamps they replaced, the number of hours of use, and other information on the economics of the project;

- two surveys on hours of use, to be taken six and eighteen months after the project begins. Metering equipment will be installed in a selected sample of participants to record the hours of use of the CFLs;
- a mid-term project implementation review to analyze whether targeted sales levels have been met and what to do if expectations have not been reached;
- an end-of-project review to critically review project results; and
- a final project evaluation performed six months after project completion to review participants' satisfaction with the CFLs.

Current assessment mechanisms are not adequate for a JI project because they do not include monitoring the power mix at the location and at the time of use of the CFLs. Without constant monitoring of the mix of power plants that generate the electricity for the locations where the lamps are installed, assessing the emission reductions from power plants that run with fossil fuels is not possible.

One of the greatest institutional constraints for demand-side energy-conservation projects is access to continuous information about the power mix at the project site and the time of use of the energy-efficient devices. The utility that distributes electricity to the location (in the case of ILUMEX, this would be the Federal Electricity Commission) should provide these data. The institutional structure to gather this kind of information already exists, but doing so on a periodic basis creates new institutional functions and new costs for the utility. The national utility would need to develop a group that gathers and reports on the power mix and on the use of the energy-efficient devices. The utility would also need to create a group that reports on GHG emissions from fossil fuel-powered plants and keeps track of energy consumption of customers that have CFLs. This latter capacity has been recently developed, and the utility already has a group dedicated to continuously monitoring and reporting power plant emissions.

generally more stable than consultants or non-governmental organizations and should probably perform the long-term monitoring and evaluation of carbon reduction/sequestration. Reports that are prepared in the short term (e.g., by the utility) can be collected and archived by a university for use in later long-term evaluations.

At a national level, the ILUMEX project (together with other active JI projects) should be evaluated periodically by the national council, which would analyze the project's evolution based on the reports prepared by the consultants. The institutions required for implementing such long-term monitoring efforts already exist, with the exception of the government multi-ministry council.

An issue of long-term project monitoring involves the project life and the transfer of carbon credits as old projects end and new ones begin. JI projects account for a given amount of carbon dioxide that is not captured or emitted, which happens over a specified time. Any carbon savings beyond that given amount are not credited. However, given the possibility of a national emissions limit, it would be preferred that projects result in a permanent reduction of GHGs. In the case of CFLs, their widespread incorporation into the market and their acceptance by the customers may result in their continued use well beyond the lifetime of the first CFLs.

If a new, similar JI project were started to replace an old one, carbon credits from one project should not be transferred to a follow-up project of the same type. JI projects are about a fixed amount of carbon, not about a rate of flow of carbon emissions. Once a project is completed, no further credits should be awarded. If a project is interrupted, or if changes occur rapidly in the power mix at the site (e.g., a new hydroelectric plant begins operation nearby), the energy saved by the CFLs may no longer reduce GHG emissions. In this situation, a new project would have to be started to fulfill the initial commitment. This would, of course, imply new costs, and credits could be transferred to the party that covers the costs of the transaction.

Beyond credit assignment, there is also the potential for carbon "leakage," i.e., reduction in greenhouse gases at the project site leading to increases in greenhouse gases elsewhere in the country. For a project like ILUMEX, a leakage could be in the form of changes in the power mix serving the nation. This might occur if the utility decreases its use of fossil fuel plants for delivering electricity to a location, decreases its use of non-fossil fuel plants in the nation, or brings in other fossil fuel plants to compensate for the lost balance of power-generating capacity. The multi-ministry council, through its periodic revision of the project, should be able to track these leakages.

1.6 External Verification and Project Enforcement

With the expectation that an international body will be established to certify JI projects, Mexico would probably accept external JI project review, as long as the external reviewing institution has been appropriately certified. It is unlikely, however, that the Mexican government would permit a foreign national governmental agency to review JI projects unless a bilateral agreement with that country already existed. There is no need to create an independent institutional structure for external reviewers as long as the multi-ministry government council exists. Mechanisms for external verification would create additional functions for the council however, requiring registration of these reviewers and a capacity to revise the verification.

Internal expertise for JI project verification could be provided through the multi-ministry council and would likely interact with the external reviewers prior to project revision by the council. If the external reviewers are foreign to Mexico, the internal experts (with authority from the council) may help the external experts with the institutions involved in the assessment of the project (e.g., surveyors, consultants, and the national electricity utility).

CHAPTER 2: CASE STUDY OF EGYPT

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2.1 Sample JI Project: Industrial Solar Thermal Heating

The use of solar energy as a source of process heat in some industrial applications, a project currently under development in Egypt, would be a good JI project candidate. Egypt's industrial sector – including the petroleum industries – contributes 27 percent of the country's total gross domestic product, accounting for 50 percent of Egypt's total energy consumption in 1992-1993. The Egyptian economy is heavily dependent on gas and oil (93 percent of total commercial energy consumption), and industrial sector consumption represents about 35 percent of the country's consumption of both oil and gas. Industrial activities in Egypt generate as many as 28 million tons of carbon dioxide each year (nearly 35 percent of the country's emissions), and because industrial process heat accounts for most of the demand for oil and gas, industrial strategies to reduce the burning of fuel oil or natural gas could significantly reduce carbon emissions. Energy efficiency, fuel switching, and the use of renewable energy sources are some good examples of such strategies.

The JI project presented here was designed to assess the technical and economic feasibility of solar heating technologies to meet the energy needs of process heat in Egyptian industries. This multi-phase project will include a feasibility study, an engineering design for the recommended technology, project implementation, and monitoring of the project's economic and environmental benefits. Currently under development by the Egyptian New and Renewable Energy Authority, the project will be financed by a grant from the African Development Bank.

limited, projects promoting energy conservation and efficiency, as well as the development and use of renewable resources, will be favored by the government. Natural gas, increased efficiency and conservation, and renewable resources are the main GHG abatement options that were presented in the United Nations Environment Program GHG abatement-costing studies for Egypt.

2.3 Project Assessment

Assessment of the industrial solar thermal heating project would be conducted jointly by the Egyptian New and Renewable Energy Authority, the Organization for Energy Conservation and Planning, and the Egyptian Environmental Affairs Agency, along with the industrial facility chosen for implementing the solar heating system. Each of these institutions currently exists and is capable of assessing this particular project as well as other similar energy efficiency projects.

Assessing the project benefits will incorporate future industrial energy demand, particularly for industrial process heat applications, as well as identify appropriate solar technologies to replace conventional energy resources for industrial process heating. This investigation will evaluate the technical, economic, and environmental viability of the recommended technologies. The cost of the solar energy generated will be compared to the cost of an equivalent amount of fossil fuel saved. The cost of the solar technologies will be compared to conventional process heat technologies. In addition, the environmental benefits of using solar energy systems and reducing fossil fuel consumption will be assessed, including evaluation of the reduction in GHG emissions and other pollutants.

Assessment Institutions

The Egyptian New and Renewable Energy Authority is a governmental entity established in 1986 to emphasize Egypt's commitment to the development of renewable energy resources. Among its responsibilities are:

actions of the U.S. Country Studies Program. The OECP is well qualified to assess JI projects, including data collection and analysis, having performed similar activities for more than 10 years. To enhance coordination of JI project activities within the energy and environmental policy framework, we suggest formalizing these many institutional processes, which now take place on an ad hoc basis.

The Egyptian Environmental Affairs Agency is the governmental body responsible for developing and monitoring the country's National Environmental Action Plan. The Action Plan provides a sound framework for government environmental efforts and focuses on needed policy reforms. These might include:

- developing and enforcing environmental standards for air and water emissions;
- relying on market forces and on the private sector (including non-governmental organizations) to resolve environmental problems;
- eliminating subsidies to energy and agricultural fertilizers and pesticides; and
- instituting full-cost recovery policies for disposal of municipal and industrial wastes.

The Environmental Affairs Agency developed the first environmental legislation (passed in 1993) in Egypt. The Agency is now developing environmental standards for air, water, and land use that were outlined in that 1993 legislation. The Agency is also responsible for inspecting and enforcing environmental legislation, working to increase public and private awareness of environmental issues, and developing and maintaining national environmental information systems.

The solar energy project is currently being assessed by the Egyptian New and Renewable Energy Authority, together with consultants from the African Development Bank. No formal mechanism currently exists to undertake joint assessment of JI projects. As a result, some criteria that characterize JI projects will not be evaluated within existing assessment procedures. For instance, the project's environmental benefits and its compatibility with

Data Requirements and Methodology

For assessing the JI solar energy project, a comprehensive analysis of industrial sector demand needs to be performed, including collecting data on industrial energy consumption by process application and by fuel type. The potential for using solar energy heating in different industrial facilities should be assessed to identify potential sites for implementation. These data may be obtained through energy audits of candidate industrial plants. Data on available solar technology for industrial heating applications are also needed, along with the availability of other technologies in the Egyptian market. These would include information on the institutional capacity for the analysis, design, manufacture, installation, and maintenance of solar technologies. Cost data for undertaking economic and financial analysis for the project also should be made available. These include the cost of solar heating systems, piping and tie-ins, controls, site works, and installation, together with engineering and design costs. Operation and maintenance costs would also be estimated over the life of the project. Fossil fuel energy savings in monetary values would be estimated using a future fuel-price structure. Finally, to undertake a complete economic and financial analysis, the discount rate should be considered together with the Egyptian currency exchange rate.

Methodologies for economic and financial analysis (e.g., for net present value and internal rates of return) would be required. Techniques for sensitivity analysis would also be needed to evaluate the impacts of some cost parameters on the economic and financial viability of the project. Data on the emission factors of GHGs from burning different fuels should be available to estimate the reduction in GHG emissions as a result of using solar heating technologies, as well as a methodology of GHG-abatement costing.

2.4 Project Long-Term Monitoring

Long-term monitoring of the environmental benefits of the project is required to ensure that the reduction of GHG emissions over time will not be lost. At the project level, the OECF

Like any other development project, the JI project will continue for a specified amount of time. In this case, the project life will be the life of the solar technology. At the end of the equipment lifetime, new, similar equipment or new, more advanced technology may replace it. In both cases, the economic and environmental benefits of the project would need to be reassessed. Replacement of the depreciated equipment might occur through JI arrangements or through an initiative of the host country. In this specific project, the African Development Bank is not likely to finance the replacement of the solar technology, so for the project to continue the owner will need to find other financial resources. Other concerns include the willingness of the project owner, the industrial facility in this case, to retrofit the technology or to abandon the whole process or the plant itself. Such decisions will have to be based on many considerations, such as the position of the industrial facility in the market at the time, the status of the technology, and the relative costs of the solar thermal heating technology compared to alternative technologies, including fossil fuel. It is clear that at the end of the JI project, the decision whether to continue the same project or to start a new one will be complicated and will involve many project participants.

2. 5 Estimating Project Benefits

Assigning GHG credits among the JI project parties is also a very complex issue. It is understandable that the GHG inventory of any country is determined by the GHG sources and sinks within the geographic territory of that country. JI projects would affect the inventory for the host country if systems emerge that allow carbon credits. Negotiations might be a reasonable way to do this, but “global” guidelines would be necessary to facilitate this process. The assigning process might affect the GHG budget of each party to the project, although the global benefits would remain the same. Consequently, the cost and benefits of the same project will be different from the standpoint of different players.

Since the project parties might be two or more countries, it is clear that the participating governments should be consulted. In many cases, global GHG accounting

enforcement of the country's environmental legislation. In Egypt, this is the Environmental Affairs Agency.

Conclusion

Based on this project-specific analysis, it is evident that an institutional structure needs to be developed to assess and monitor JI projects in Egypt. This institutional structure would make use of existing institutions that are already functioning and capable of handling the issues of GHG emissions and mitigation options. Further enhancement of the professional capacity of those institutions might be needed in some cases. For long-term monitoring of environmental benefits from a JI project, a GHG accounting system needs to be developed in each participating country. This accounting system could be part of the institutional scheme needed to handle different aspects of JI projects, including the carbon transactions among different projects. It is preferable that host country institutions be involved in the process of external verification if needed.

CHAPTER 3: CASE STUDY OF THAILAND

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The Thai government has not developed an official policy on joint implementation, and Thailand does not have any ongoing JI projects. This paper reports on preliminary research conducted by the Thailand Environment Institute to identify potential JI projects within the Thai forestry sector. The comments in this paper on the approach that the government would take if a JI project were implemented in Thailand should be regarded as the author's point of view.

3.1 Sample JI Project: Conservation and Economic Forestry Plantations

Thailand is facing a serious problem preserving its remaining forest areas. Over the last two decades, forest cover has declined from more than 40 percent to less than 30 percent of the country's total land area. Two forest types are distinguished in the country: conservation forests and economic forests. In conservation forests, comprised of national parks, wildlife sanctuaries, and watershed areas, economic activity is prohibited. In economic forests, a variety of economic activities may take place with permission from the government.

As of 1994, the total area for conservation forests was about 7.6 million hectares,² while economic forests comprised about 12.8 million hectares. However, millions of people live in and exploit areas designated as conservation forests, which contributes to forest degradation. Despite the logging ban enacted in 1989, deforestation continues, although at a reduced rate, which aggravates soil fertility problems, water shortages, flooding, and landslides. The government's new forest policy intends to increase forest area to 40 percent of the total

¹Thanks are due to Dr. Sopin Tongpan and Mr. Matthew Markopoulous for providing useful information.

² Of total conservation forest area, 2.7 million hectares are national forest, 2.6 million hectares are wildlife sanctuaries, and the remaining 2.3 million hectares are watershed areas.

reforestation will permit the restored areas to form a secondary forest type with a complex structure similar to that of natural forests. Therefore, more carbon will be sequestered on-site than would otherwise be the case with conventional and simpler plantation systems.

Restoring forest cover to previously degraded areas is expected to provide both on-site and off-site positive environmental impacts. In addition to carbon sequestration, benefits will include soil protection, the enhancement of soil nutrient and carbon status, microclimate amelioration, restoration of the local hydrology regime, and biodiversity conservation. By virtue of their close proximity to natural forests, plantings on degraded areas should be progressively colonized by forest flora and fauna as they mature. Non-environmental benefits will accrue through the involvement of local communities in the protection of the project area. The community fund, if established, will supplement incomes and contribute to more sustainable forms of agriculture on existing land in exchange for participation by the community.

3.2 Project Acceptability

Although the Thai government has not set criteria for JI project acceptance, the issue is currently being considered. Because expanding Thailand's forested area is already a government policy, any reforestation project is likely to be accepted. This is especially true for reforestation projects in degraded conservation forest areas. Accordingly, Thailand is committed to forest-management systems based on sustainable principles to conserve existing forests and to restore degraded ones. A JI forestry project within this context would thus be both accepted by and beneficial to Thailand.

The task of reforesting degraded conservation areas is the responsibility of the State Reforestation Division, which is under the Reforestation Office of the Royal Forestry Department. Reforestation in conservation areas normally consists of the Forestry Department

The Royal Forestry Department is expected to be in charge of assessment related to the fertility of replanted trees. Technical experts from academic institutions, such as researchers from the Faculty of Forestry at Kasetsart University or from the Office of Environmental Policy and Planning, can be employed to conduct emissions assessments. The investor may also employ a specialist as part of the team. Additional involvement at the national level, such as from the investor's government, and at the international level, such as from a multilateral organization, might be necessary for project credibility and acceptability.

Costs incurred from project assessment can be shared. The cost of forest assessment, which is normally the responsibility of the Royal Forestry Department, will be borne by the Thai government, while the cost of the emissions assessment, which is not included in a normal forestry project, should be borne by the JI investor as part of the project cost.

Data Requirements and Methodology

Sufficient data and information are required to accurately measure real GHG emissions sequestration. Since the reforested sites will be protected, with the plantings forming a long-term carbon sink, a life-cycle approach to measuring carbon dioxide sequestration should be carried out. Key issues here will include types of indigenous species, the life expectancy of the trees, the degree of resilience to environmental stress, and the effects of drought, fire, soil erosion, and human disturbance. A preliminary survey of planting sites will provide data on existing vegetation and soil carbon status, from which baseline carbon levels and emissions can be calculated.

The actual progress, growth, and survival rate of trees on the project site will need to be monitored periodically. With this information, as well as knowledge of the carbon content of each species, carbon dioxide sequestration can be tracked. In addition, periodic assessments

Policy and Planning, the Land Development Department, the Agricultural Promotion Department, a non-governmental organization, academic institutions, or foreign auditors.

The government prefers long-term forestry projects, and in this case the project will create long-term carbon sinks. However, if a short-term JI project is followed by a second JI project with the same goal, the carbon credits of the first project should be transferable to the new project, as long as the credits have not yet been used.

It should also be mentioned that protection of the forests at the project site might simply displace encroachment pressure to nearby forest areas (in a process known as carbon dioxide leakages), thereby negating any benefits of the JI project. Accordingly, to prevent any encroachment or "leakage," the long-term protection of the reforested area will become the responsibility of a community situated close to the project site, under the general supervision of the Forestry Department. In return for protection of the project site from encroachment, fire, and other threats, the community will be provided with remuneration either in the form of direct individual payments or, more suitably, a community fund for agricultural improvements, tree planting, or similar activities. Through the provision of such a fund, pressure to encroach on neighboring natural forests should be eased and "leakages" prevented.

3.5 Estimating Project Benefits

The question of credit allocation has to be decided on a case-by-case basis between the parties involved and will be determined by the nature of the joint implementation activity and the level of GHG emissions reduction or sequestration. For example, "benefits" from credit sharing might not be an important factor for the Thai government's acceptance, if the reforestation JI project is located in a degraded conservation area, because the project would conform to the government's forestry policy. On the other hand, credit allocations might be a prime factor for the government when considering a JI project that is not consistent with the

CHAPTER 4: CASE STUDY OF INDIA

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In this paper an attempt is made to understand the existing institutional structures and to suggest appropriate institutional arrangements for monitoring and assessing JI projects. Two kinds of JI projects that allow consideration of the necessary institutional arrangements are afforestation projects for meeting biomass needs and decentralized bioenergy projects for meeting energy needs and providing a substitute to fossil fuels. India has experience with projects in both of these areas, and these JI project objectives are consistent with India's national development goals.

4.1 Sample JI Projects: Afforestation and Bioenergy Projects

Afforestation

As much as 78 million hectares of land have been degraded in India, much of which can be reclaimed through revegetation. Since 1985, India's afforestation project has created 1.5 to 2 million hectares of forest plantations each year, making it the largest afforestation project in the world. Projected environmental and socio-economic benefits from afforestation include increased incomes, protection of biodiversity, sustainable local energy sources, and reduced carbon emissions. Afforestation initiatives in a densely populated country such as India can be targeted to meet growing biomass needs and to realize global benefits by conservation of existing carbon sinks or forests by enhancing carbon in soils and by increasing carbon in long-term storage (such as in structural timber). Afforestation is proposed for degraded forest and village common lands and for degraded farmland no longer suitable for cultivation.

Table 1: Benefits from Afforestation and Decentralized Bioenergy Projects

	Afforestation Projects	Bioenergy Projects
Environmental Benefits	Soil and water conservation	Reclamation of degraded lands for biomass energy production
	Biodiversity conservation in situ	Substitution of bioelectricity and biomass liquid fuels for fossil fuel sources
	Carbon sequestration in soil and vegetation	Reduction of reliance on kerosene and diesel fuel
	Production of non-timber forest products to meet local needs	Shift from coal thermal electricity
		Net reduction of carbon emissions
Socio-economic Benefits	Production of non-timber forest products to meet local needs	Fulfillment of village energy needs with sustainable energy sources
	Generation of employment opportunities and income for the local community	Creation of self-reliant village energy systems
		Generation of employment opportunities and income for the local community
		Enhancement of local technical skills

Another important need is an independent national agency to monitor periodically the short-term performance of JI projects. Such an agency should be largely composed of individuals not involved in project implementation (e.g., technical experts, representatives from national and international non-governmental organizations, professional consultants, nominees of donor agencies, and government and beneficiary representatives), and the monitoring agency should be selected cooperatively by the host government and participating donor agency(s).

India has no such institutions for assessment and short-term monitoring of forestry or bioenergy projects. World Bank-funded projects are usually assessed by an expert team convened by the Bank. Projects supported by bilateral agencies are usually assessed by an external agency from the donor country, and generally some local experts are included in the assessment process.

Data and Methodology Requirements

Data and methodology requirements for JI project assessment differ for the two types of JI projects proposed. For afforestation projects:

- Data requirements include information on the standing carbon in vegetation and soil before project implementation, annual accumulation of carbon in woody biomass and soil, and carbon emissions from soils and end-use products through combustion and decomposition; and
- Methodologies for emission inventory are available but need to be standardized and disseminated. Methodologies are also needed for selecting and assessing baseline emissions and dynamics of GHG flows and for periodic monitoring of changes in stocks and flows of GHGs in vegetation, soil, and products.

For bioenergy projects:

- Data requirements include information on the current rate of fossil fuel use; the levels of woody biomass production; the stock and flows of wood and carbon in plantation forests; the extent of production and use of bioenergy; and the extent of fossil fuel use, the substitution by bioenergy, and the amount of carbon emissions avoided; and
- Methodologies are needed for estimating current rates of use of electricity (coal thermal), kerosene, and diesel; the emissions from use in the project area; the carbon stock and flows in biomass production process as feedback for energy on an annual basis; and the emissions avoided through substitution of fossil fuel sources.

To date, development projects in India have not been seriously assessed for global climate-change benefits. No assessment methodology has been developed, and very few people in India's development arena are aware of the methodology used by the Intergovernmental Panel on Climate Change or by the Organization for Economic Cooperation and Development. As such, India has made no assessment of the Intergovernmental Panel's methodology for estimating emissions inventory or sequestration potential at national levels. Nor has there been serious discussion or agreement on a baseline for comparison. Institutional capacity building will likely be necessary to develop the skills and staff to undertake the local and global assessment of GHG flows. Technical expertise is widely available within India, but it is dispersed throughout different institutions and not fully engaged in research on climate change issues.

Currently, such JI project assessment mechanisms do not exist and need to be created. Once these mechanisms are established, the cost of assessment must be built into the project as is usually done in World Bank-funded projects. Further, it is especially important to ensure that funds dedicated to monitoring GHG flows are not used for other purposes.

protecting the forest -- be recognized and compensated as part of the JI project process. The national JI team or a team from the United Nations Development Program or the United Nations Environment Program created to guide and monitor JI projects could be expected to monitor any leakages in the targeted global benefits.

4.6 External Verification and Project Enforcement

Whether verification of GHG emissions reduction by external agencies would be acceptable to all governments is not clear. A joint team of experts from the donor and recipient countries may provide an alternative. This team could verify the flows of GHGs, in particular, the incremental global benefits above and beyond the baseline, and would only monitor and verify the assessments made by full-time project teams.

An alternative to a joint donor/recipient country team might be a team from the United Nations Development Program or United Nations Environment Program, which would be responsible for external verification of JI projects worldwide. Vesting United Nations agencies with power to enforce certain actions where GHG project commitments have not been met are likely to be acceptable to recipient governments in developing countries. Generally, when India receives financial project support from the World Bank or the Asian Development Bank, the Indian government accepts these organizations' periodic review. This is also common with most Overseas Development Association projects. A World Bank-managed agency may not be acceptable to many developing country governments, but there would likely be no serious governmental objection to periodic project review and recommendations by a verification team from the United Nations Development Program or the United Nations Environment Program, or by a national joint team. Another option may be to have some agency, such as Science and

For both forestry and bioenergy projects, local institutions could decide to implement the projects with the help of private enterprise on a turnkey basis. Local non-governmental organizations could have a significant role in organizing the village-level institutions. All funding could be routed through the district and village organizations. Monitoring of the global benefits, particularly GHG stocks and flows, would be done by the project team, the national JI team, and by the international team from the United Nations Development Program or United Nations Environment Program.

CHAPTER 5: CASE STUDY OF CHINA³

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Fuelwood is an important source of household energy in rural areas in China. According to the Ministry of Forestry, total sustainable fuelwood supply in 1990 was about 180 million tons. Total fuelwood consumption in that same year, however, was about 310 million tons for household and rural industrial energy use, resulting in over-cutting by about 130 million tons. Such exploitation of fuelwood supplies leads to deforestation and has become a serious problem for forestry development in China. Options for reducing exploitation of fuelwood resources include improving household stove efficiency, creating fuelwood plantations, and supplying coal to rural households. From the point view of mitigating CO₂ emissions, only the first two are reasonable options.

5.1 Sample JI Project: Fuelwood Plantations and Energy-Efficient Household Woodstoves

To meet the increasing demand for household fuel and to relieve the pressures leading to deforestation in China, our proposed project aims to develop cost-effective and environmentally acceptable methods for producing and conserving fuelwood by focusing on improving household stove efficiency and developing sustainable fuelwood supplies.

³We would like to emphasize that because the Chinese government has not agreed to any specific JI project, none has been prepared for discussion as of now. The potential of JI projects remains a subject of discussion in a very small circle of people closely involved in climate change issues within the government. What we present in this paper is based only on our understanding, and does not represent official opinion, although it may match the official policy when it is developed.

The proposed JI project has not been assessed formally as a GHG-mitigation JI project. It is currently proposed as a rural energy project to prevent deforestation and to help mitigate the pressures of the energy shortage. The existing technical and economic evaluation of the project was conducted by the Energy Research Institute. We suggest, though, that the project be considered a JI project because reduction and sequestration of GHG is expected from the use of more efficient woodstoves and the development of a sustainable fuelwood supply. The total CO₂ emissions reduction will be about 180,000 tons of carbon.

5.2 Project Acceptability

At present there are neither formal JI projects in China nor any official procedures for their acceptance. However, there are contradictory opinions concerning JI, and many of the related concepts, such as tradable emissions permits, have not been well defined. Nevertheless, we believe that the acceptance procedures for JI projects in China may include the following steps:

- The Chinese government and concerned governments or international organizations will reach bilateral or multilateral agreement on JI projects, including a set of criteria and terms that identifies the scope and the scale of technical or financial support from a developed country or countries;
- JI project proposals collected from different sectors will be evaluated to determine their compliance with the criteria agreed upon for JI projects. One of the criteria could be consistency with the objectives stated in Agenda 21, a document issued by the Chinese Government that lists its top investment priorities in the areas of environmental and economic development. JI projects should be consistent with the national goal of sustainable development; and
- Projects will be formally approved by a government agency authorized by the State Council, such as the State Planning Commission, STEC, the State Science and Technology Commission, or the NEPA. The selected project proposals will be forwarded for discussion to the concerned foreign governments or international organizations.

As the Chinese economy moves from a centrally planned system to a market system, the private sector will play an increasingly important role in economic development. As a consequence, opportunity for private sector projects will increase. There already exist two kinds of private sector enterprises in China: those owned by private investors, including foreign investors, and those under collective ownership. At present, collectives produce more than 30 percent of China's total industrial output, while nearly all of the agricultural capacity is privately owned. Once the Chinese government accepts the concept of JI, the private sector will become involved and its projects will be assessed and followed by the same institutions as public sector projects. Priority on JI projects probably will not be given to the private sector, however. Despite current economic reform in China, the government still plays an important role in economic development. In the long run, no important economic activity can be successfully developed without support from the government.

5.3 Project Assessment

Assessment Institutions

Many public institutions in China, including academic research institutes, universities, and governmental agencies, are involved in studies on GHG reduction and sequestration, with respect to both policy and technical matters. Local experts are well versed in climate change and related issues. Comprehensive studies that address GHG-reduction measures in China have been carried out in collaboration with the World Bank, the Asian Development Bank, and other foreign institutions. However, except for the chlorofluorocarbon-replacement project conducted in collaboration with the United States Environmental Protection Agency, no specific policy has been formally adopted and put into practice to reduce or sequester GHGs. The current assessment mechanism for JI is not adequate due to a lack of experience with JI,

Few non-governmental organizations exist in China, and those that do exist are not influential in the policy-making process. Because JI projects are based on an agreement between country governments, non-governmental organizations and private organizations can contribute, at most, technical assistance. We also expect that the Chinese government will not permit an international organization to play a primary role in a domestic activity.

Data Requirements and Methodology

The results of JI projects will be measured in terms of GHG emissions reduction. In the proposed fuelwood project, the data on greenhouse gas emissions can be measured in terms of energy savings and increased wood storage. Capacity construction projects, on the other hand, present a problem for obtaining real and measurable results. Indirect effects from these projects can be estimated or calculated because capacity construction will help policy improvement or the realization of technical projects that will lead to the direct reduction of greenhouse gas emissions.

No JI projects currently exist in China; nor are there standardized assessment methodologies or institutions with experience in the assessment of GHG-reduction projects. For future assessment of JI projects, guidelines on data collection, criteria, and methodology should be developed and localized to fit the specific conditions of the host country. In addition, both the financial evaluation of projects and the evaluation of emissions reductions need to be standardized. Because projects often have multiple goals and benefits, JI projects need to carefully clarify the components that respond to the JI project goal of GHG mitigation. The criteria for selecting the most effective project should be considered as well. If the concept of least cost per unit emission decrease is considered, the question will be how the national

of selected and approved projects will be paid for by the counterpart country as part of the cost of the project. One alternative is to have the Global Environment Facility pay the assessment costs for developing countries through the United Nations Development Program's technical assistance program. However, before JI comes into practice, a Priorities List or Country Program should be developed in accordance with the Montreal Protocol. The United Nations Development Program would be a good agency to organize and finance this task.

5.4 Project Long-Term Monitoring

Based on the Conference of Parties' criteria that "joint implementation activities should, where appropriate, be accompanied by measures to ensure their long-term environmental benefits," a monitoring mechanism and institution should be established. In the proposed project, the real and measurable results will be found in the improvements to tree plantations and stove efficiencies. At present, the local forestry-management station and rural energy office are assigned to monitor the results of the project's implementation. The problem is that there is neither an existing institution nor a mechanism for long-term monitoring.

An example of the need for long-term monitoring is the assumption in the proposed project that social conditions will not change much over time. No one can guarantee that the social and economic conditions will not change over the long term and that the designated target of the proposed project will not be greatly influenced. In a previous fuelwood plantation project the objective was to supply fuelwood to rural households. Several years after its implementation, farmers shifted from firewood to coal for energy, because the tree plantation improved the quality of land (due to afforestation) and provided the local people with the possibility of developing fruit production. The fruit production, in turn, significantly helped the local economy, so that farmers could afford to buy coal, which is more convenient than

Any proposed JI project should also include analysis of possible GHG “leakages.” Most likely, no specific governmental institution will be assigned to track GHG emissions that exceed agreed levels, but we expect that the Chinese government will maintain the right to verify the reliability of information on leakages reported by any institution.

5.6 External Verification and Project Enforcement

Verification institutions that are officially appointed by the counterpart government or by authorized international organizations will probably be accepted by the host governments of most developing countries. A formal mechanism or institutional structure, consisting of both international and domestic experts, should be set up for external verification. The mechanism and methodology of verification should be discussed and agreed upon by all the involved parties and approved by the host government.

In general, we do not expect the Chinese government to react positively toward joint verification with external participants. However, cooperation with international organizations on the subject is possible with, for example, the United Nations agencies. The external review process for the ozone-depleting substances phase-out program, which already exists under the Montreal Protocol, can be considered a precedent for JI projects.

It is our understanding that even a well-designed project may not achieve its expected target, and the JI projects will be no exception in this respect. If a JI project is approved by the host government, the host government is obliged to ensure its implementation. If commitments are not met because local parties have not performed their duties, the host government should enforce the implementation of the project. However, if commitments are not met because of poor project design or other unexpected problems, enforcement will be very difficult.

